

IN THE CLAIMS

Please amend the claims as follows:

- 1 1. (Withdrawn) A method of p-type doping in ZnO comprising:
2 forming an acceptor-doped material having ZnO under reducing conditions,
3 thereby insuring a high donor density; and
4 annealing the specimens of said acceptor-doped material at intermediate
5 temperatures under oxidizing conditions so as to remove intrinsic donors and activate
6 impurity acceptors.
- 1 2. (Withdrawn) The method of claim 1, wherein said reducing conditions comprise a
2 hydrogen containing atmosphere.
- 1 3. (Withdrawn) The method of claim 1, wherein said reducing conditions comprise a
2 non- hydrogen containing atmosphere.
- 1 4. (Withdrawn) The method of claim 1, wherein said acceptor-doped material comprises
2 a substrate, a n-type ZnO layer deposited on said substrate, and a p-type layer deposited
3 on said n-type ZnO layer.
- 1 5. (Withdrawn) The method of claim 1, wherein said intermediate temperatures
2 comprise a temperature range between 200 °C and 700 °C.
- 1 6. (Withdrawn) A method of forming p-n junctions using p-type ZnO comprising:
2 forming an acceptor-doped material having ZnO under reducing conditions,
3 thereby insuring a high donor density; and

annealing the specimens of said acceptor-doped material at intermediate temperatures under oxidizing conditions so as to remove intrinsic donors and activate impurity acceptors.

7. (Withdrawn) The method of claim 6, wherein said reducing conditions comprise a hydrogen containing atmosphere.

8. (Withdrawn) The method of claim 6, wherein said reducing conditions comprise a non- hydrogen containing atmosphere.

9. (Withdrawn) The method of claim 6, wherein said acceptor-doped material comprises a substrate, a n-type ZnO layer deposited on said substrate, and a p-type layer deposited on said n-type ZnO layer.

10. (Withdrawn) The method of claim 6, wherein said intermediate temperatures comprises a temperature range between 200 °C and 700 °C.

11. (Currently Amended) A wide band gap semiconductor device comprising:

a substrate;

an annealed n-type ZnO layer directly ~~formed~~-positioned on said substrate; and

an annealed p-type ZnO layer directly ~~formed~~-positioned on said n-type ZnO layer, said annealed p-type ZnO comprises an acceptor-doped material under reducing conditions, said annealed n-type ZnO layer and said annealed p-type ZnO layer are annealed at intermediate temperatures under oxidizing conditions between approximately 200 °C and 700 °C to activate p-type conductivity;

9 wherein said n-type ZnO layer and said p-type ZnO layer are annealed in air to
10 activate p-type conductivity.

1 12. (Currently Amended) The wide band gap semiconductor device of claim 11, wherein
2 said ~~p-type ZnO layer is produced in reducing conditions comprising acceptor-doped~~
3 material is exposed to a hydrogen containing atmosphere.

1 13. (Currently Amended) The wide band gap semiconductor device of claim 11, wherein
2 said acceptor-doped material is exposed to said p-type ZnO layer is produced in reducing
3 conditions comprising a non-hydrogen containing atmosphere.

1 14. (Cancelled).

1 15. (Cancelled).

1 16. (Currently Amended) A p-n junction comprising:

2 a substrate;

3 an annealed n-type ZnO layer directly ~~formed~~ positioned on said substrate; and

4 an annealed p-type ZnO layer directly ~~formed~~ positioned on said n-type ZnO
5 layer, said annealed p-type ZnO comprises an acceptor-doped material under reducing
6 conditions, said annealed n-type ZnO layer and said annealed p-type ZnO layer are
7 annealed at intermediate temperatures under oxidizing conditions between approximately
8 200 °C and 700 °C to activate p-type conductivity;

9 wherein said n-type ZnO layer and said p-type ZnO layer are annealed in air to
10 activate p-type conductivity.

1 17. (Currently Amended) The p-n junction of claim 16, said acceptor-doped material is
2 exposed top-type ZnO layer is produced in reducing conditions comprising a hydrogen
3 containing atmosphere .

1 18. (Currently Amended) The p-n junction of claim 16, wherein said acceptor-doped
2 material is exposed top-type ZnO layer is produced in reducing conditions comprising a
3 non- hydrogen containing atmosphere .

1 19. (Cancelled) .

1 20. (Cancelled)